

CLAIMS

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1. A magnetic recording medium comprising a nonmagnetic glass or silicon substrate having non-oriented irregularities on a surface thereof, and, having applied thereon in the following order:

5 an underlayer which comprises a second underlayer consisting of nickel and phosphorus and a third underlayer containing chromium as a principal component thereof which are formed in the described order, in the presence or absence of a first underlayer containing chromium as a principal component thereof, on said substrate, and

10 a magnetic recording layer which has a circumferential direction of easy magnetization and contains cobalt as a principal component thereof, and also contains chromium and platinum in combination with tantalum or tantalum and niobium.

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2. The magnetic recording medium according to claim 1, in which said second underlayer has circumferentially distributed stripe-like ridges and grooves on a surface thereof.

3. The magnetic recording medium according to claim 2, in which said second underlayer has a surface roughness Ra_1 in a circumferential direction of less than 1 nm and a surface roughness Ra_2 in a radial direction of less than 2 nm, and the roughness Ra_1 is smaller than the roughness Ra_2 .

4. The magnetic recording medium according to claim 1, in which a ratio (at%) of the nickel and phosphorus in the second underlayer is in the range of 67 to 85:33 to 15.

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5. The magnetic recording medium according to claim 1, in which said magnetic recording layer is constituted from a four-component metal alloy of cobalt, chromium, platinum and tantalum which is represented by the following formula:

~~Co_{bal.}-Cr₁₄₋₂₂-Pt₄₋₁₀-Ta_x~~
in which

~~bal. means a balance amount, and
x is a in the range of 1 to 5 at%.~~

~~6. The magnetic recording medium according to
claim 1, in which said magnetic recording layer is
constituted from a five-component metal alloy of cobalt,
chromium, platinum, tantalum and niobium which is
represented by the following formula:~~

~~10 Co_{bal.}-Cr₁₄₋₂₂-Pt₄₋₁₀-Ta_x-Nb_y
in which~~

~~bal. means a balance amount, and
a sum of x and y (x + y) is in the range of 1
to 5 at%.~~

~~15 7. The magnetic recording medium according to
claim 6, in which an amount of the added tantalum and
that of the added niobium in the five-component alloy are
exactly or substantially the same as each other.~~

~~20 8. The magnetic recording medium according to
claim 1, in which said magnetic recording layer has a tBr
value (product of a layer thickness t of the magnetic
recording layer and its residual magnetic flux density
Br) of 40 to 180 G.μm.~~

~~25 9. The magnetic recording medium according to
claim 1, in which said underlayer has a three-layered
structure in which a thickness of the first underlayer is
in the range of 5 to 25 nm, a thickness of the second
underlayer is in the range of 10 to 200 nm, and a
thickness of the third underlayer is in the range of 5 to
30 60 nm.~~

~~35 10. The magnetic recording medium according to
claim 1, in which said underlayer and said magnetic
recording layer each is a thin layer formed by
sputtering.~~

~~11. The magnetic recording medium according to claim 10,~~

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cont.

~~in which said magnetic recording layer is a thin layer formed at a deposition temperature of 150 to 350°C upon sputtering.~~

~~12. The magnetic recording medium according to claim 1, which further comprises, applied over said magnetic recording layer, a protective layer consisting of carbon or diamondlike carbon.~~

13. A magnetic recording disk device comprising a recording head section for recording in a magnetic recording medium and a reproducing head section for reproducing information, in which said magnetic recording medium comprises a nonmagnetic glass or silicon substrate having non-oriented irregularities on a surface thereof, and, having applied thereon in the following order:

an underlayer which comprises a second underlayer consisting of nickel and phosphorus and a third underlayer containing chromium as a principal component thereof which are formed in the described order, in the presence or absence of a first underlayer containing chromium as a principal component thereof, on said substrate, and

a magnetic recording layer which has a circumferential direction of easy magnetization and contains cobalt as a principal component thereof, and also contains chromium and platinum in combination with tantalum or tantalum and niobium; and

said reproducing head section is provided with a magnetoresistive head.

14. The magnetic recording disk device according to claim 13, in which said magnetoresistive head is a MR head, an AMR head or a GMR head.

15. The magnetic recording disk device according to claim 14, in which said magnetoresistive head is disposed on a stiction-free slider which is provided with rails for creating a flying force in its surface to be opposed to said magnetic recording medium and in which slider said rails have applied on a flying surface thereof two

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